UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/501,742	02/07/2005	Arne Berg	MRKS/0137	1058

7590 05/20/2009

William B Patterson
Moser Patterson & Sheridan
3040 Post Oak Boulevard
Suite 1500
Houston, TX 77056

EXAMINER	
GAKH, YELENA G	

ART UNIT	PAPER NUMBER
1797	

MAIL DATE	DELIVERY MODE
05/20/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/501,742	BERG, ARNE	
	Examiner	Art Unit	
	Yelena G. Gakh, Ph.D.	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 March 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) *33 and 34* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-32 and 35* is/are rejected.

7)☒ Claim(s) *2,6,11,18 and 32* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 June 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06/29/04, 02/06/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Election of claims 1-33 and 35 with traverse and amendment to the claims filed on 03/02/09 are acknowledged. Claims 1-35 are pending in the application. In traverse the Applicant states "that the Examiner has not properly established or satisfied the criteria for a proper requirement for restriction", because both Groups I and II recite "the addition of reactive elements or catalysts so as to create a gas that diffuses into optical fiber". The examiner would like to note that this language was not present in the originally filed claims. It is not apparent, as to how the examiner was supposed to establish restriction requirements for the claims, which were amended in response to the restriction requirements. Therefore, the examiner does not consider this a proper language of the traverse. Moreover, since it is not apparent, as to which specific reagents can react with which specific components in the chemical environment to produce hydrogen gas, the examiner considers the language of the amended claims indefinite, and thus interprets it in the broadest meaning. According to such interpretation, any component in fiber optics can lead to formation of hydrogen gas, especially if the component in the environment is unstable and yields hydrogen gas upon interaction with any component in fiber optical detector. Furthermore, such sensors are well known in the art, as can be seen from the present Office action. Thus, the arguments are not convincing and the restriction is made FINAL. Furthermore, amended claim 33 belongs to Group II and therefore is withdrawn from consideration. Thus, claims 33-34 are withdrawn from consideration and claims 1-32 and 35 are considered on merits.

Drawings

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the two FBGs, and the compensating means arranged to measure the reflected Bragg wavelengths of the at least two FBGs, wherein at least one FBG is exposed to the gas and at least one other FBG is protected from the gas, with two FBG closely spaced, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing

sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 2, 6, 11, 18 and 32 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The subject matter of claim 2 is recited in the amended claim 1. Claim 6 recites the subject matter, which is encompassed by claim 1, since any reaction of the reagent with the component in the environment can be called a corrosion process. Claim 11 recites a natural phenomenon, and thus does not recite any additional active steps comparing to the parent claim. Claim 18 recites the light source, which is inherent to the system for detection of the signal from the optical fiver optics, since without this element the system is not enabled. The same is true for claim 32, since without the optical signal detection and signal analyzing means the system of the parent claim becomes inoperable, and therefore these elements are inherent to the system of the parent claim.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it

pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-32 and 35 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The examiner respectfully reminds the Applicants that according to MPEP §2163:

"**2163.02. Standard for Determining Compliance with Written Description Requirement**:

The courts have described the essential question to be addressed in a description requirement issue in a variety of ways. An objective standard for determining compliance with the written description requirement is, "does the description clearly allow persons of ordinary skill in the art to recognize that he or she invented what is claimed." *In re Gosteli*, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989). Under *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991), to satisfy the written description requirement, an applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession of the invention, and that the invention, in that context, is whatever is now claimed. The test for sufficiency of support in a parent application is whether the disclosure of the application relied upon "reasonably conveys to the artisan that the inventor had possession at that time of the later claimed subject matter." *Ralston Purina Co. v. Far-Mar-Co., Inc.*, 772 F.2d 1570, 1575, 227 USPQ 177, 179 (Fed. Cir. 1985) (quoting In re Kaslow, 707 F.2d 1366, 1375, 217 USPQ 1089, 1096 (Fed. Cir. 1983)). Whenever the issue arises, the fundamental factual inquiry is whether the specification conveys with reasonable clarity to those skilled in the art that, as of the filing date sought, applicant was in possession of the invention as now claimed. See, e.g., *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991). An applicant shows possession of the claimed invention by describing the claimed invention with all of its limitations using such descriptive means as words, structures, figures, diagrams, and formulas that fully set forth the claimed invention. *Lockwood v. American Airlines, Inc.*, 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (Fed. Cir. 1997). Possession may be shown in a variety of ways including description of an actual reduction to practice, or by showing that the invention was "ready for patenting" such as by the disclosure of drawings or structural chemical formulas that show that the invention was complete, or by describing distinguishing identifying characteristics sufficient to show that the applicant was in possession of the claimed invention. See, e.g., *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 68, 119 S.Ct. 304, 312, 48 USPQ2d 1641, 1647 (1998); *Regents of the University of California v. Eli Lilly*, 119 F.3d 1559, 1568, 43 USPQ2d 1398, 1406 (Fed. Cir. 1997); *Amgen, Inc. v. Chugai Pharmaceutical*, 927 F.2d 1200, 1206, 18 USPQ2d 1016, 1021 (Fed. Cir. 1991) (one must define a compound by "whatever characteristics sufficiently distinguish it").

Claim 1 recites:

A system for use in the detection or measurement of at least one characteristic relating to a chemical environment, the system comprising:

an optical fiber arranged to receive light from an optical source;

the system being adapted to let a gas derived from said chemical environment diffuse into the optical fiber thereby altering the optical properties of the optical fiber, so that changes in the optical properties of the optical fiber due to the in-diffusion of said gas can be determined by optical signal detection and signal analyzing means for deriving from the determined changes at least one characteristic value representing the chemical environment; and reactive elements or catalysts adapted to react or interact with constituents of the chemical environment, so as to create hydrogen gas.

The specification discloses:

"The corrosion sensing system can detect hydrogen generated from the corrosion process itself, or reactants can be utilized. Reactants 16 can be embedded in the encapsulant 15 in the same manner as for bonding the fiber tube 13, applied onto the armouring wires 11 themselves or as separate elements in the annulus. Separate elements can for instance be mounted in similar grooves opposite to the grooves with the fiber sensors, as illustrated in Figure 4. Reactants sensitive to **water, carbon dioxide, hydrogen sulfide** and/or other materials to be detected can be applied. As illustrated in Figure 5, the reactants 16 can be embedded in epoxy 15 in a groove 12 of the armor wire 11 in such a way that a polishing process exposes a surface of the reactant or catalyst to the chemical environment 2." (Page 4, lines 14-23).

"To detect other substances, components that react efficiently with these substances can be utilized. For example, carbon dioxide (CO_2) and hydrogen sulfide (H_2S) can be detected by measuring the hydrogen generated when these dissolve in water in the presence of suitable reactants. H_2S hydrolyses (dissolves) in water and, depending on the pH, ionizes to establish an equilibrium with H^+, HS^- and H_2S (aq). CO_2 dissolves in water and establishes an equilibrium with H_2CO_3(aq), which further, depending on the pH, ionizes to form H^+, HCO_3^- and CO_3^{2-}. The solubility of zinc (Zn) and magnesium (Mg) is proportional to the H^+-concentration in the solution, subject to the condition that there are no passivating surface films. These metals will react and form H_2 which can be detected. This will yield the pit of the solution and a good indication of the rate of corrosion in anaerobic conditions.

Separate measurement of CO_2 and H_2S may be more difficult. A possible solution would be to use chemicals which react selectively with H_2S forming H_2 and sulfates. H_2S is a weakly oxidizing material, but would be able to reduce e.g. Fe3+ to Fe2+ and MnO_2 to Mn^{2+}. This reaction forms sulphur and H^+, yielding an increase in pH in the surrounding environment which normally would be detectable using e.g. a reaction with zinc to indicate H_2S." (Page 6, lines 17-33).

The examiner failed to find a disclosure corresponding to the claimed subject matter, i.e. a method and system for detection or measurement of at least one characteristics relating to a chemical environment based on formation of the hydrogen gas from the constituents of the chemical environment. First, what is disclosed is related to some specific gases such as carbon dioxide or hydrogen sulfide, not to some "characteristics relating to a chemical environment". Second, specific metals, such as Zn or Mg, are

shown to potentially produce hydrogen gas from CO_2 and H_2S only upon the condition of dissolving them in acidic medium, not in the gaseous state. Furthermore, the examiner failed to find any description of producing hydrogen gas when using iron as a reactive element as recited in claim 35.

Therefore, the Applicant failed to "reasonably convey to the artisan that the inventor had possession at that time of the later claimed subject matter."

6. Claims 1-32 and 35 rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the method of detection of the specific components of the environment, such as hydrogen sulfide or carbon dioxide, when are dissolved in water and react with specific metals or metal oxides with the condition, that H_2S and CO_2 are not adsorbed on the metal surface and thus are capable of producing some hydrogen, does not reasonably provide enablement for any other method. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims. The prior art discloses the following:

Svensson et al. (J. Electrochem. Soc, 1995) disclose "Sulfidation of Zinc by Traces of Hydrogen Sulfide in Air" and demonstrate that sulfidation of Zn is an extremely slow process:

> The effect of H_2S in the sub-parts per million range on the atmospheric corrosion of zinc has been investigated in the laboratory. Each sample was exposed individually to air with careful control of pollutant concentration, relative humidity, and flew conditions. Monitoring of H_2S concentration at the outlet of the corrosion chamber was used to study the reaction of H_2S with zinc metal during the first 24 h. Four-week exposures were also performed to study the corrosion rate and the corrosion products. The deposition of H_2S on zinc strongly depended on the relative humidity. In dry air H_2S deposition was limited to an uptake on the order of a monolayer. At 70 to 99% RH the initial deposition rate of H_2S was faster, and the deposition reached a steady state after 15 to 20 h of exposure. Analysis of the H_2S evolved from the samples when treated with acid showed 95 -+ 5 % of the H_2S deposited on zinc to be present in sulfide form. X-ray photoelectron spectroscopy and ion chromatographic analysis supported this finding, small amounts of sulfate being detected besides sulfide. After a 4 week exposure to 410 ppb H2S at 95 % RH, zinc blende (sphalerite) (ZnS) was identified by grazing angle x-ray diffraction. It was concluded that the zinc sulfide film grows by bulk diffusion of ions. The rate of zinc sulfidation was independent of H_2S concentration between 25 and 780 ppb."

Asai et al. (Korean J. Chem. Eng., 1997) teach "Kinetics of Absorption of Hydrogen Sulfide into Aqueous Fe(III) solutions":

> "In our recent studies, absorption of H_2S into the aqueous $Fe_2(SO_4)_3$ and $FeCl_3$ solutions with various values of ionic strength and pH was investigated in an agitated vessel with a flat interface. The experimental results for both systems revealed that the species which reacts with H_2S is $FeOH^{2+}$. The absorption rates were explained by the theory of gas absorption with an irreversible (1,1)-th order reaction between H_2S and $FeOH^{2+}$. The reaction rate constants were independent of

> the ionic strength of the solution and correlated as a function of temperature. In this paper, kinetics and mechanism of these absorption reactions are reviewed and the identity for both systems is emphasized." (Abstract).

Rodriguez et al. (J. Chem. Phys., 1999) investigate "Reaction of H_2S with MgO (100) and Cu/MgO (100) surfaces: Band-gap size and chemical reactivity". They indicate that "[m]etallic magnesium reacts vigorously with H_2S fully decomposing the molecule at temperatures below 200°K", which is different from the reaction of H_2S with Zn described by Svensson et al.

Lyons et al. ("Standard Handbook of Petroleum& Natural Gas Engineering", 1996) disclose:

Stress corrosion cracking occurs at the metal surface in the form of pitting corrosion, which is the result of iron sulfide (FeS) deposits on the metal surface. The iron sulfide is cathodic to steel, contributing to pitting corrosion of scale-free areas. Basically, stress corrosion cracking susceptibility is a function of hydrogen sulfide concentrations, alloy compositions, hydrogen sulfide partial pressure, residual and applied stresses, and temperature. Very high-strength alloys can crack almost instantly when subjected to a sour environment [158,159].

Sulfide stress cracking is the worst type of corrosion in the presence of hydrogen sulfide. Sulfide stress cracking is a function of hydrogen sulfide concentration (as low as 1-3 ppm), hydrogen sulfide partial pressure, stresses, material yield strength, temperature and pH. Sulfide stress cracking mostly occurs in very highly acidic environments. The mechanism of sulfide stress cracking involves a combination of stress corrosion cracking and hydrogen embrittlement.

Hydrogen embrittlement is a function of the hydrogen absorption characteristics of the metal in the aggressive environment, which is the formation of molecular hydrogen from atomic hydrogen within the metal structure [160].

The atomic hydrogen created at the surface of the metal will either combine to form hydrogen gas or will be absorbed at grain boundaries. Trace amounts of sulfur, arsenic, antimony, phosphorus and tellurium act to promote absorption of atomic hydrogen by the surface [157,160].

Once the atomic hydrogen has been absorbed by the metal, it diffuses through the material until it comes in contact with the metal structure's discontinuities or defects, such as inclusions, carbides or grain boundaries. The atomic hydrogen then combines to form molecular hydrogen, which puts additional pressure on the metal discontinuities or defects.

Hydrogen embrittlement occurs below the metal surface. pH strongly influences hydrogen embrittlement, since sour environments may contain significant traces of hydrogen sulfide as well as HCl. Therefore, hydrogen sulfide alters hydrogen embrittlement by enhancing additional atomic hydrogen at the cathode. This combined action of hydrogen embrittlement and hydrogen sulfide contributes to sulfide stress cracking. The formation of atomic and molecular hydrogen is shown as

$$\begin{array}{l} Fe + 2H^+ \rightarrow Fe^{2+} + 2H^\circ \quad (a) \\ \qquad\quad \uparrow\downarrow \\ H^\circ + H^\circ \rightleftarrows H_2 \uparrow \quad (b) \end{array} \qquad (6\text{-}38)$$

Metallurgical factors and alloying elements are the most important considerations for tubular goods selection in sour oil and gas environments. High-alloy metals, and steels below 80,000 psi yield and 90,000 psi tensile strength are reported to be relatively resistant to cracking due to hydrogen sulfide [161,162].

Filming amines and organic phosphates such as amine phosphates are reported to be effective corrosion inhibitors in sour environments. These inhibitors are usually prepared as oil-soluble for lower-pressure and temperature, flowing wells, while water-soluble inhibitors are mostly recommended at higher temperatures and pressures [163–168]. Table 6-65 gives inhibitors for hydrogen sulfide corrosion.

which indicates that interaction between metal, hydrogen sulfide, formed atomic hydrogen and sulfur is very complex and not always leads to formation of hydrogen gas.

Thus, from the prior art it follows that interaction between metal reagents and some environment components, such as H_2S and CO_2, is complex and does not unambiguously lead to formation of hydrogen. Furthermore, the specification does not provide any working examples.

Moreover, the disclosure regarding monitoring transmission loss on page 5 is unclear. Two wavelengths (1244 and 1300 nm) are disclosed as the wavelengths, which are both used for

monitoring the transmission loss. This makes it non-apparent, as to how it is possible to monitor the transmission loss, of there is no reference at which the signal without the loss can be detected?

From all above it can be concluded that it would be an undue experimentation for a person of ordinary skill in the art to perform the method in the scope of the claims, if it is possible to perform at all.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1-32 and 35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites "a system for use in the detection of at least one characteristics relating to a chemical environment". First, it is not clear from the preamble of the claim, if the system is designed for such detection, or it is somehow applied differently for the detection? Further, the claim recites that the system is adapted to let a gas derived from the environment diffuse into the optical fiber; and then the claims recite reactive elements or catalysts adapted to react with the constituents to create hydrogen gas. It is not clear from the language of the claims, as to what another gas is recited in the beginning of the claims, if it is not hydrogen gas.

Moreover, it is not apparent, as to what "at least one characteristic relating to a chemical environment" and what "reactive elements or catalysts adapted to react or interact with constituents of the chemical environment so as to create hydrogen gas". There are thousands of characteristics, including constituents, of the chemical environment, and there are hundreds of reagents which can form hydrogen gas out of these constituents, which leads to a enormous number of combinations of the constituents and reagents encompassed by the language of the claims.

The Applicants are respectfully referred to the following excerpt from MPEP:

> "§2171 **Two Separate Requirements for Claims Under 35 U.S.C. 112, Second Paragraph:**

> The second paragraph of 35 U.S.C. 112 is directed to requirements for the claims:
> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
>
> There are two separate requirements set forth in this paragraph:
> (A) the claims must set forth the subject matter that applicants regard as their invention; and
> (B) the claims must particularly point out and distinctly define the metes and bounds of the subject matter that will be protected by the patent grant.
>
> The first requirement is a subjective one because it is dependent on what the applicants for a patent regard as their invention. The second requirement is an objective one because it is not dependent on the views of applicant or any particular individual, but is evaluated in the context of whether the claim is definite - i.e., whether the scope of the claim is clear to a hypothetical person possessing the ordinary level of skill in the pertinent art.
>
> Although an essential purpose of the examination process is to determine whether or not the claims define an invention that is both novel and nonobvious over the prior art, another essential purpose of patent examination is to determine whether or not the claims are precise, clear, correct, and unambiguous. The uncertainties of claim scope should be removed, as much as possible, during the examination process.
>
> The inquiry during examination is patentability of the invention as applicant regards it. If the claims do not particularly point out and distinctly claim that which applicants regard as their invention, the appropriate action by the examiner is to reject the claims under 35 U.S.C. 112, second paragraph. *In re Zletz*, 893 F.2d 319, 13 USPQ2d 1320 (Fed. Cir. 1989). If a rejection is based on 35 U.S.C. 112, second paragraph, the examiner should further explain whether the rejection is based on indefiniteness or on the failure to claim what applicants regard as their invention. *Ex parte Ionescu*, 222 USPQ 537, 539 Bd. App. 1984)"

Furthermore:

"§2172 **Subject Matter Which Applicants Regard as Their Invention:**

> If the language of the claim is such that a person of ordinary skill in the art could not interpret the metes and bounds of the claim so as to understand how to avoid infringement, a rejection of the claim under 35 U.S.C. 112, second paragraph, would be appropriate. See *Morton Int 'l, Inc. v. Cardinal Chem. Co.*, 5 F.3d 1464, 1470, 28 USPQ2d 1190, 1195 (Fed. Cir. 1993)."

The language of the claims "is such that that a person of ordinary skill in the art could not interpret the metes and bounds of the claim so as to understand how to avoid infringement", and therefore rejection under 35 U.S.C. 112, second paragraph, is proper.

Furthermore, in claim 4 it is not apparent, as to which tube element is provided for protection and packaging of the optical fiber; if this is a hermetic enclosure, then it is not apparent, as to how the system is enabled.

From claim 7 it is unapparent, as to what is the value representing the ingress of water, and which changes are meant in the claim. Also, it is not apparent, as to how any changes can be measured, since the corrosion process is extremely slow.

From claim 11 it is not apparent, as to which "additional loss" is recited in the claim, since no loss has been recited in the parent claims, and therefore it is not clear as to which loss is additional.

In claim 13 it is clear, which additional coating is meant in the claim, and what this coating comprises. Fiber optics by definition comprises a core and a coating - which additional coating is meant in the claim?

In claim 15 it is not apparent, as to which inlet means is meant in the claim, and the inlet to what? The subject matter in the claim is unclear.

Claim 16 recites the limitation "the galvanic protection of metal armoring", which does not have an antecedent basis. Moreover, the subject matter for claim 16 is not clear. The examiner interprets it as reciting the sensor comprising several metals.

Claim 19 is totally unclear.

Claim 20 is not clear, since it is not apparent, as to whether the direct detection is performed with the transmission means, and if it is, then it is not clear, what is the difference between the transmission means used for detecting the signals and the transmission means for detecting the loss. The examiner considers any transmission means being capable of detecting transmission loss.

For claims 23-25 both peaks (1244 nm and 1300 nm) disclosed in the specification as being used for monitoring loss, and therefore the language of the claims is not supported by the disclosure.

Claim 27 are unclear as to which means for compensating for wavelength change is meant in the claims. Claim 28 recites the means for compensating the temperature changes. The examiner failed to find description of such means in the specification, which makes it unclear, as which means the claim recites.

Since claims 27 and 28 are so unclear, the examiner is not capable of searching the subject matter of these claims.

From claim 29 the structure of the sensor system is not clear, and therefore the subject matter of claims 29-31 cannot be searched, as no corresponding drawing is provided for this embodiment.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. **Claims 1-7, 11, 13-16, 18-20, 23-25, 32 and 35** are rejected under 35 U.S.C. 102(b) as being anticipated by Klainer et al. (US 5,026,139) (Klainer).

Klainer discloses a fiber-optics sensor comprising a metal clad made of metal porous film, including that of iron (Claim 35), along with a detection system generating a response to the components of the chemical environment (see Abstract and Claim 5), which meets the requirements of claims 1-3, 5-7, 11 and 35.

Regarding claims 13-14, while Kaliner does not specifically indicate that the fiber optics comprises coating made of porous polymer, he indicates that the metal clad is at least partially covers the fiber optics core, with conventional fiber optics comprising acrylate or polyimide (see page 5, lines 31-32 of the instant specification), and therefore at least partial polymer coating is inherent to Kaliner's system.

Regarding claim 15, the system inherently comprises inlet means, since the system is arranged so the sample could interact with the fiber-optics sensor.

Regarding claim 16, Kaliner's fiber optics can comprise several metals in the clad.

Regarding claim 18, Klainer teaches a light source 26 (Fig. 1).

Regarding claims 19 and 32, Kleiner discloses dual detector units 62a and 62b and analyzing system (Fig. 6B).

Regarding claim 20, Kleiner discloses transmission means, which are capable of detecting transmission loss (Abstract).

Regarding claims 23-25 Kleiner discloses the system which can be used for detecting at least two different wavelengths (col. 2, lines 31-44), with the system inherently capable of measuring wavelengths at 1244 nm and 1300 nm.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. **Claims 12 and 26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Klainer in view of Perez et al. (US 5,646,400).

While Klainer does not specifically disclose Bragg grating or dopants in the system, Perez discloses fiber optics sensor comprising Bragg grating and dopants which improve performance of the sensor, which makes it obvious for a person of the ordinary skill in the art to modify Klainers' system with Perez' improvements.

13. **Claim 22** are rejected under 35 U.S.C. 103(a) as being unpatentable over Klainer in view Falco et al. (US 4,846,547) (Falco).

While Klanier does not specifically disclose OTDR, OTDRs are well known in the prior art detection based on fiber optic sensors, as can be seen from Falco. According to recent KSR decision:

MPEP §2141. **The KSR Decision and Principles of the Law of Obviousness.**

The Supreme Court in KSR reaffirmed the familiar framework for determining obviousness as set forth in *Graham v. John Deere Co.* (383 U.S. 1, 148 USPQ 459 (1966)), but stated that the Federal Circuit had erred by applying the teaching-suggestion-motivation (TSM) test in an overly rigid and formalistic way. *KSR*, 550 U.S. at ___, 82 USPQ2d at 1391. Specifically, the Supreme Court stated that the Federal Circuit had erred in four ways: (1) "by holding that courts

and patent examiners should look only to the problem the patentee was trying to solve " (*Id.* at ___, 82 USPQ2d at 1397); (2) by assuming "that a person of ordinary skill attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem" (Id.); (3) by concluding "that a patent claim cannot be proved obvious merely by showing that the combination of elements was obvious to try'" (*Id.*); and (4) by overemphasizing "the risk of courts and patent examiners falling prey to hindsight bias" and as a result applying "[r]igid preventative rules that deny fact finders recourse to common sense" (*Id.*). In *KSR*, the Supreme Court particularly emphasized "the need for caution in granting a patent based on the combination of elements found in the prior art," *Id.* at ___, 82 USPQ2d at 1395, and discussed circumstances in which a patent might be determined to be obvious. Importantly, the Supreme Court reaffirmed principles based on its precedent that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *Id.* at ___, 82 USPQ2d at 1395. The Supreme Court stated that there are "[t]hree cases decided after *Graham* [that] illustrate this doctrine." *Id.* at ___, 82 USPQ2d at 1395. (1) "In *United States v. Adams*, . . . [t]he Court recognized that when a patent claims a structure already known in the prior art that is altered by the mere substitution of one element for another known in the field, the combination must do more than yield a predictable result." *Id.* at ___, 82 USPQ2d at 1395. (2) "In *Anderson 's-Black Rock, Inc. v. Pavement Salvage Co.*, . . . [t]he two [pre-existing elements] in combination did no more than they would in separate, sequential operation."*Id.* at ___, 82 USPQ2d at 1395. (3) "[I]n *Sakraida v. AG Pro, Inc.*, the Court derived . . . the conclusion that when a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious." *Id.* at ___, 82 USPQ2d at 1395-96 (Internal quotations omitted.). The principles underlining these cases are instructive when the question is whether a patent application claiming the combination of elements of prior art would have been obvious. The Supreme Court further stated that:

> When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Id.* at ___, 82 USPQ2d at 1396.

When considering obviousness of a combination of known elements, the operative question is thus "whether the improvement is more than the predictable use of prior art elements according to their established functions." *Id.* at ___, 82 USPQ2d at 1396.

Thus, it would have been obvious to modify Kreiger's sensor system with Falco's OTDR optical measurement means.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (571) 272-1257. The examiner can normally be reached on 9:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Y. Kim can be reached on (571) 272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Yelena G. Gakh/
Primary Examiner, Art Unit 1797

5/16/2009